Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1. (currently amended) A case-hardened rolling element which is made from a steel material comprising 0.45 to 1.5 wt% C and 0.3 to 1.5 wt% Cr, wherein a proportion of the C content to the Cr content ~~is adjusted such that when the C content is~~ [[0.55]] ~~wt~~[[%,]] ~~the Cr content is~~ [[0.3]] ~~wt~~[[%]] ~~or more and when the C content is~~ [[1.5]] ~~wt~~[[%,]] ~~the Cr content is less than~~ [[1.8]] ~~wt~~ [[%]] <u>satisfies the following formula:</u>

<u>$0.55 \leq$ Cr wt%/C wt% ≤ 1.2</u>,

said steel material optionally including 0.1 to 0.5 wt% V, said steel material containing cementite dispersed therein, wherein an average Cr concentration in the cementite ((Fe,Cr)3C) dispersed in said steel material is 2.5 to 10 wt%, and

said rolling element having a rolling contact surface layer having a case-hardened layer being formed by induction heating

and subsequent cooling of said rolling contact surface layer, said case-hardened layer having a structure tempered at a low temperature in which 2 to 18% by volume of cementite <u>containing Cr solid-dissolved therein</u> is dispersed in a martensite parent phase, said martensite parent phase containing 0.25 to 0.8 wt% carbon ~~as a total carbon content~~ in said case-hardened layer.

Claim 2. (canceled)

Claim 3. (previously presented) The case-hardened rolling element according to claim 1, wherein the cementite dispersed in the rolling contact surface layer is substantially granulated and the cementite has an average particle diameter of 0.1 to 1.5 μm.

Claim 4. (previously presented) The case-hardened rolling element according to claim 1, wherein the cementite dispersed in the rolling contact surface layer has at least a portion thereof in a pearlitic structure.

Claim 5. (previously presented) The case-hardened rolling element according to claim 1, wherein the rolling contact surface layer contains 10 to 60% by volume retained austenite.

Claim 6. (previously presented) The case-hardened rolling element according to claim 1, made from a steel material having substantially the same composition as that of the rolling contact surface layer, the rolling contact surface layer being subjected to induction hardening so as to have a parent phase of a martensitic structure in which prior austenite grains are refined to a size equal to or higher than ASTM grain size No. 10.

Claim 7. (previously presented) The case-hardened rolling element according to claim 1, which is made from a steel material further containing (i) 0.5 to 3.0 wt% Si, 0.25 to 1.5 wt% Al, or 0.5 to 3.0 wt% (Si + Al); and (ii) one or more alloy elements selected from the group consisting of Mn, Ni, Mo, Cu, W, B and Ca, and the balance being Fe and unavoidable impurity elements.

Claim 8. (previously presented) The case-hardened rolling element according to claim 7, wherein 0.3 to 1.5 wt% Ni is added to the steel material containing 0.25 to 1.5 wt% Al.

Claim 9. (currently amended) The case-hardened rolling element according to claim 1,

which is made from a steel material containing at least 0.05 to 0.2 wt% in total of one or more alloy elements selected from the group consisting of Ti, Zr, Nb, Ta and Hf, and one or more compounds selected from the group consisting of the carbides, nitrides and carbonitrides of said alloy elements, said compounds having an average particle diameter of 0.1 to 5 μm and are dispersed within the steel material,

wherein the rolling contact surface layer contains 0.5 to 1.5 wt% C ~~based on the total carbon content~~ in said rolling contact surface layer, the rolling contact surface layer having a martensite parent phase tempered at a low temperature after quenching.

Claim 10. (currently amended) The case-hardened rolling element according to claim 1, which is a gear having teeth, and wherein the relationship between a DI value <u>in inches</u> indicating the hardenability of a martensite phase and a gear module M, wherein M is a value obtained by pitch <u>circle</u> diameter divided by the number of teeth, satisfies the following relationship: $DI \leq 0.12 \times M + 0.2$, said martensite phase being previously a ferrite phase and containing 0.25 to 0.8 wt% carbon.

Claim 11. (currently amended) The case-hardened rolling element according to claim 10, wherein said steel material contains 0.53 to 1.5 wt% C, 0.3 to 1.5 wt% Cr, wherein a proportion of the C content to the Cr content ~~is adjusted such that when the C content is~~ [[0.55]] ~~wt~~[[%,]] ~~the Cr content is~~ [[0.3]] ~~wt~~[[%]] ~~or more and when the C content is~~ [[1.5]] ~~wt~~[[%,]] ~~the Cr content is less than~~ [[1.8]] ~~wt~~[[%]] <u>satisfies the following formula:</u>

$$\underline{0.55 \leq Cr\ wt\%/C\ wt\% \leq 1.2},$$

said steel material further contains 0.2 to 0.5 wt% Mn, 0.5 to 2 wt% Si, 0.2 wt% or less Mo, and 0.2 wt% or less W, and optionally includes 0.1 to 0.3 wt% V.

Claim 12. (currently amended) The case-hardened rolling element according to claim 10, wherein said steel material contains 1.2 to 1.5 wt% C, 0.6 to 1.5 wt% Cr, wherein a proportion of the C content to the Cr content ~~is adjusted such that when the C content is~~ [[0.55]] ~~wt~~[[%,]] ~~the Cr content is~~ [[0.3]] ~~wt~~[[%]] ~~or more and when the C content is~~ [[1.5]] ~~wt~~ [[%,]] ~~the Cr content is less than~~ [[1.8]] ~~wt~~ [[%]] <u>satisfies the following formula:</u>

$$\underline{0.55 \leq \text{Cr wt\%/C wt\%} \leq 1.2},$$

said steel material further contains 0.2 to 0.5 wt% Mn, 0.5 to 2 wt% Si, 0.2 wt% or less Mo, and 0.2 wt% or less W, and optionally includes 0.1 to 0.3 wt% V.

Claim 13. (previously presented) The case-hardened rolling element according to claim 10, wherein a compressive residual stress of 50 kgf/mm^2 or more remains at least on the surfaces of the roots of the teeth.

Claim 14. (previously presented) The case-hardened rolling element according to claim 13, wherein a compressive residual stress of 50 kgf/mm^2 or more is allowed to remain on tooth profile surface layers each comprising a tooth top, a pitch circle position, a tooth root and a tooth bottom, by a mechanical processing means which is shot peening for generating said compressive residual stress.

Claim 15. (previously presented) The case-hardened rolling element according to claim 14, wherein a compressive residual stress of 50 kgf/mm^2 or more is allowed to remain on surface layers at the ends of the teeth by a mechanical processing means which is shot peening for generating said compressive residual stress.

Claim 16. (canceled)

Claim 17. (currently amended) A method of producing a case-hardened rolling element from a steel material containing 0.45 to 1.5 wt% C and 0.3 to 1.5 wt% Cr, wherein a proportion of the C content to the Cr content ~~is adjusted such that when the C content is~~ [[0.55]] ~~wt~~[[%,]] ~~the Cr content is~~ [[0.3]] ~~wt~~[[%]] ~~or more and when the C content is~~ [[1.5]] ~~wt~~ [[%,]] ~~the Cr content is less than~~ [[1.8]] ~~wt~~[[%]] satisfies the following formula:

$$\underline{0.55 \leq \text{Cr wt\%/C wt\%} \leq 1.2},$$

said steel material optionally including 0.1 to 0.5 wt% V,

the method comprising:

a Cr concentration treatment step for heating the steel material such that an average Cr concentration of cementite dispersed in the steel material is 2.5 to 10 wt%;

an induction hardening treatment step for induction heating the steel material from a temperature equal to or lower than the A1 temperature to a quenching temperature of 900 to 1100°C within 10 seconds, followed by rapid cooling; and

a tempering treatment step for heating the steel material to 100 to 300°C.

Claim 18. (previously presented) The method of producing a case-hardened rolling element according to claim 17, wherein the Cr concentration treatment step is comprised of a first heating treatment and/or a second heating treatment, the heating temperature of the first heating treatment being the A1 temperature to 900°C in the two phase (cementite + austenite) region, the heating temperature of the second heating treatment being 300°C to the A1 temperature in the two phase (cementite + ferrite) region.

Claim 19. (previously presented) The method of producing a case-hardened rolling element according to claim 17, wherein the steel material contains 0.8 to 1.5 wt% C,

wherein the Cr concentration treatment step comprises a heating treatment at the A1 temperature to 900°C in the two phase (cementite + austenite) region, which is followed by a spheroidizing treatment step in which granular cementite having an average particle diameter of 0.1 to 1.5 μm is dispersed by slow cooling or cooling to a temperature equal to or lower than

the A1 temperature and then reheating to a temperature equal to or higher than the A1 temperature.

Claim 20. (previously presented) The method of producing a case-hardened rolling element according to claim 17, which further has a preheating treatment step in which the steel material is preheated at 300°C to the A1 temperature before the induction hardening treatment step, and

wherein the speed of heating from a temperature equal to or lower than the A1 temperature to a quenching temperature of 900 to 1100°C in the induction hardening treatment step is set to 150°C/sec or more.

Claim 21. (canceled)

Claim 22. (previously presented) The method of producing a case-hardened rolling element according to claim 17, further comprising a mechanical treatment step in which a compressive residual stress of 50 kgf/mm^2 or more is generated by a treatment which is shot peening, in a part or the whole of the rolling contact surface layer of the rolling element after the induction hardening treatment step.